

Geastrum caririense



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Geastrum caririense R.J. Ferreira, Accioly, S.R. Lacerda, M.P. Martín & Baseia, *sp. nov.*

Etymology. In reference to the type locality, Cariri region.

Classification — *Geastraceae*, *Geastrales*, *Agaricomycetes*.

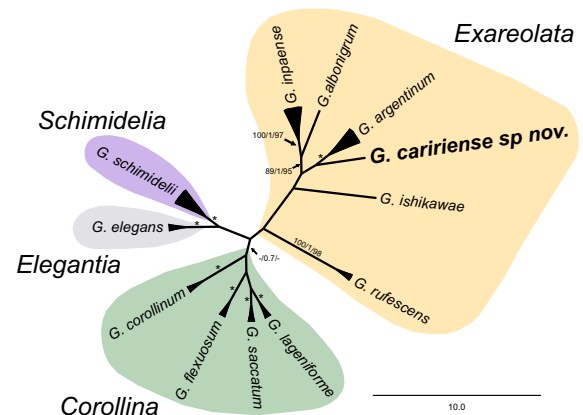
Unexpanded *basidiomata* epigeous, globose to subglobose, just prior to slightly open, umbonate, 14–23 mm high × 15–28 mm wide, surface rugose with irregular cracks, brown to pale brown (5E5 to 6D4, Kornerup & Wanscher 1978), with a few soil incrustations. Expanded basidiomata saccate, 12–29 mm in height (including peristome) × 24–58 mm wide. *Exoperidium* splitting into 4–10 revolute, triangular and irregular rays, non-hygroscopic. *Mycelial layer* slightly encrusted with soil at the base, persistent, orange to pale brown (KW6A4 to KW6D4) or brownish orange (KW6C3), formed by hyaline to greenish hyphae in 5 % KOH, branched, 1.6–3(–4) µm wide, lumen evident, sinuous walls, 0.6 ± 0.1 µm thick. *Fibrous layer* papery, pastel red to brownish orange (KW7A4 to KW6C3), 1–2.5 mm thick when fresh, formed by hyaline hyphae in 5 % KOH, 2–4.5 µm wide, lumen evident, branched, straight walls, 0.7 ± 0.1 µm thick. *Pseudoparenchymatous layer* persistent, glabrous, brownish grey to reddish grey (KW8D2 to KW8B4), cracking at the ray bends and tending to form a pseudoparenchymatous collar around the endoperidium in some specimens, formed by pyriform to oval cells, 19.5–48(–54.5) µm high × 27–58 µm wide, pale yellow in 5 % KOH, straight walls, 0.6 ± 0.2 µm thick. *Endoperidial body* globose to subglobose, 8–19 mm high × 10–21 wide, sessile, glabrous, grey to greyish brown (KW5D1 to KW5E3), apophysis absent. Peristome fibrillose to lacerate in age, mammiform, with the same colour as the endoperidium, up to 1–3 mm high, slightly delimited by a greyish white (KW1B1) annulum. Mature gleba powdery, brownish grey to dark brown (KW7E2 to KW8F4). *Eucapillitium* (2–)2.5–5 µm wide, branched, encrusted, verrucose, lumen evident, pale brown in 5 % KOH, straight walls, 0.6 ± 0.1 µm thick. *Basidiospores* globose to subglobose, 4.5–6.5 µm high × 5–7 µm diam (\bar{x} = 5.7 ± 0.5 × 5.5 ± 0.5, Q_m = 1.05, n = 30), brown in 5 % KOH, densely covered by columnar warts with truncate apex, 0.4–0.6 µm, confluent around the apiculum.

Habitat, Habit and Distribution — Growing on leaf-litter on the shaded ground of the forest; solitary to gregarious. The distribution of *G. caririense* is restricted to the municipality of Crato, Ceará State, Brazil. The specimens were found in the Caatinga domain in a permanent protection area in Araripe National Forest, Cariri region.

Typus. BRAZIL, Ceará, Crato, Floresta Nacional do Araripe, alt. 972 m, S 07°14'51.0" W39°28'43.8", on soil covered by leaf litter, 1 May 2014, R.J. Ferreira 71 (holotype UFRN-Fungos 2266, ITS and LSU sequence GenBank MF158626 and MF158627, MycoBank MB822275; isotype HCDAL 17).

Colour illustrations. Brazil, Pernambuco, Floresta Nacional do Araripe, where the specimens were collected; immature basidiome *in situ* (HCDAL 17); mature basidiome *in situ* (UFRN-Fungi 2266); basidiospores under SEM (UFRN-Fungi 2266); verrucose capillitium under SEM (UFRN-Fungi 2266). Scale bars: basidiomata = 10 mm, basidiospores and capillitium = 2 µm.

Notes — *Geastrum caririense* is mainly characterised by its brownish and cracked mycelial layer, peristome, fibrillose to lacerate, poorly delimited, basidiospores with columnar warts confluent around the apiculum. *Geastrum inpaense* is morphologically close to *G. caririense*; however, it is easily distinguished by the non-cracked mycelial layer with presence of mycelial tufts, and smaller spores of 2.5–4 µm in width including ornamentation (Cabral et al. 2014). Another related species is *G. albonigrum*, but it clearly differs by its hairy and detached mycelial layer and smaller basidiospores of 4–5 µm in width including ornamentation (Sousa et al. 2014). *Geastrum argentinum* also resembles *G. caririense*, but has a peeling-off coriaceous mycelial layer, non-delimited peristome, and develops on a subiculum (Zamora et al. 2013). On the other hand, *Geastrum ishikawae* can be distinguished from *G. caririense* by its cottony to woolly mycelial layer, pruinose endoperidium, non-delimited with coarsely folded peristome, and basidiospore size and ornamentation, 4.5–7 µm diam including ornamentation (Crous et al. 2016a). *Geastrum rufescens* differs from this new species by the cracked and evanescent pseudoparenchymatous layer in age, non-delimited peristome and mycelial layer strongly encrusted with debris and sand (Sunhede 1989). *Geastrum aculeatum*, *G. echinulatum* and *G. litchiforme* are morphologically similar to *G. caririense*, but they have an aculeate, equinulated and pilose mycelial layer, respectively (Silva et al. 2013, Hemmes & Desjardin 2011). Moreover, molecular data from ITS and LSU show with high support that *G. caririense* is different from the other species in sect. *Exareolata*.



One of the 189 equally most parsimonious trees of ITS nrDNA sequences was obtained after a Branch and Bound parsimony search using PAUP v. 4 (Swofford 2003). The new *Geastrum* species, *G. caririense*, is shown in **bold**. The accession numbers from EMBL/GenBank databases are indicated. Bootstrap support values greater than 50 % are indicated on the branches, as well as posterior probabilities obtained after a Bayesian analyses in MrBayes (Ronquist 2012). *Geastrum elegans* was included as outgroup. CoreDRAW® X8 software was used to edit the final tree.

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